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TITLE

REPORT OF PINE BEETLE SURVEY OF THE KLAMATH INDIAN RESERVATION, OREGON

Seasons of 1941 and 1942

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by

William D. Bedard
Portland, Oregon
April 29, 1943

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REPORT OF PINE BEETLE SURVEY

OF THE

KLAMATH INDIAN RESERVATION

OREGON

Seasons of 1941 and 1942

Approved by:

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April 29, 1943

SUMMARY

A. The 1940 and 1941 Infestations (Complete Record)

1. Primary insect - Western pine beetle in ponderosa pine
2. Total pine timber killed on reporting area (Table 2)-

Year	No. Trees	Volume BM	Average Volume Per Acre	Percent Stand
1940	40,000	27,500,000	38	0.6
1941	35,480	14,839,000	20	0.34

3. Classification of infestation - Light epidemic in 1940; low endemic in 1941.
4. Trend of infestation - Downward from previous year, with the 1940 losses 17 percent lower than those of 1939, and the 1941 losses 43 percent lower than in 1940.

B. The 1942 Infestation (Partial Record)

1. Primary insect - Western pine beetle in ponderosa pine
2. Probable trend - Unchanged or perhaps slightly higher than 1941.
3. Control work recommended - None.

FOREST INSECT SURVEYS - KLAMATH INDIAN RESERVATION

AND INCLUDED PRIVATE LANDS

SEASONS OF 1941 AND 1942

Prior to 1941 the results of annual forest insect surveys to ascertain the extent and amount of insect-caused ponderosa pine mortality on the Klamath Indian Reservation were reported by Mr. Harold Weaver, under whom the surveys were conducted. Since Mr. Weaver's 1940 report, no summary of subsequent surveys has been submitted. It is the purpose of this report to summarize the surveys of the seasons of 1941 and 1942 in order that no gap shall exist in this series of loss reports.

The 1941 survey was conducted by Messrs. Charles Chester of the Spokane Office of Indian Affairs and W. J. Buckhorn of the Bureau of Entomology and Plant Quarantine. They were assisted by Messrs. Gilbert, Long, Norris, Pieck, and Sieman of the Indian Service. A one-hundred percent cruise was made intermittently during the period from September 23 to October 21, 1941, on 15 check plots (13 of 640 acres each and 2 of 320 acres each) totalling 8,920 acres.

The 1942 survey was performed during the period of October 8 to 15, 1942, by the writer with the assistance of Messrs. Boyd M. Adams and Clarence E. Wallace. Owing to the shortage of man-power and funds, the Indian Service and the Bureau decided to reduce the number and size of the check plots on the Reservation to a number commensurate with the rest of the Klamath Basin survey. The final selection comprised eight 320-acre plots, totalling 2,560 acres, which, by their plotted trends, showed that they were most representative of the Reservation. The cost of this survey, excepting transportation and the writer's salary, was borne by the Reservation. In addition, the Forest Supervisor's Office furnished a man familiar with the area who located the desired check plots for the crew. This greatly facilitated the work by reducing the time required for the survey, so that it was possible to examine the eight plots in eight days. J. M. Whiteside gave valuable assistance in checking the statistical data on plot losses.

The estimates of annual losses appearing in the report are based on the cruises of the check plots. Infestation trends were computed from the plot data and used together with previous loss records to make the general estimates for the various units.

The estimates of virgin timber acreage have been corrected to January 1, 1941, by means of cut-over records furnished by the Forest Supervisor's office.

RESULTS OF THE SURVEY

Losses in 1940.

The 1941 survey completed the loss records for 1940 and secured partial data for 1941. Gross western pine beetle losses on the check plots as a whole were down 17 percent from the 1939 level, averaging 81 board feet per acre, or .79 percent of the stand (Table 1). There was considerable variation in the losses on individual plots as well as on the several infestation areas. In the Sprague River Area, the losses on four of the six plots were from 1 to 55 percent higher than those of 1939. On all other plots the losses ranged from 8 to 65 percent lower than those of 1939. The mortality on the South Calimus plot (No. 14) was the severest recorded in 1940, with 4.3 percent of the stand killed in one year.

Estimates of gross losses for the whole Reservation (Table 3) show that approximately 27,500,000 board feet or 0.6 percent of the stand were killed in 1940. Separate estimates were made for the Indian and Long Bell Lumber Company ownerships represented on the Reservation. These estimates show that approximately 0.7 and 0.3 percent of the stand were lost on each of these tracts in 1940.

Losses in 1941.

A general reduction in infestation has occurred throughout the Klamath Indian Reservation in 1941. The survey of check plots showed that the gross loss of ponderosa pine due to western pine beetle attack during 1941 ranged from 12 to 92 board feet per acre, or from 0.11 to 0.76 percent of the stand (Table 2). This represents an average reduction of 43 percent below the 1940 level, although there is considerable variation from this average on the different plots. A reduction of only 9 percent occurred on the Calimus Butte plot, because increases or decreases are expected to be small in areas such as this where the site is good and the timber comprises mainly vigorous, non-susceptible trees. At the other extreme, reductions of 73 and 78 percent respectively occurred on the Taylor and Little Yamsey plots. These plots are about medium in site quality and susceptibility to beetle attack which is probably the reason why they show the greatest reduction at this particular stage of the infestation.

This type of low endemic infestation was characterized by scattered single trees which were usually the more decadent individuals in the stand. Infested trees were generally lightly attacked by the western pine beetle and frequently contained a miscellaneous mixture of insects comprising mainly *Dendroctonus brevicomis*, *Melanophila* sp., and *Ips* sp., and were not characteristic of the usual western pine beetle infested tree.

Estimates for the entire Reservation (Table 4) indicated a gross loss of 0.34 percent of the stand as contrasted with 0.32 percent in the Klamath Basin as a whole. Separate estimates were again made for the Reservation and Long Bell Tract, which indicated gross losses of 0.35 and 0.28 percent of the stand respectively. The accompanying map shows that heaviest losses were found in the fringe timber of the Sprague River area and that most of the other areas were but lightly infested. Although this loss appears to be rather insignificant compared to former losses, the total for the Reservation amounts to nearly fifteen million board feet which is still rather large when considered on the basis of financial loss in capital assets.

A somewhat different picture is presented when losses are considered in terms of net loss, because 1941 was one of the few years in the past two decades when ponderosa pine growth probably offset the insect-caused losses. It is difficult, however, to determine a net loss figure because there are no available data for ponderosa pine growth on cut-over lands, and in addition, part of the growth is offset by losses due to other agents such as wind. Considering these factors, a net gain of about 35 board feet per acre appears to be a fair estimate for 1941. It is evident at once that this net gain is quite small even during a year of very low infestation. This would indicate that this rate of net gain would require a long period of time to offset the tremendous losses which occurred during the past two decades.

Infestation Trend.

The trend of the western pine beetle infestation on the Reservation during the past ten years is shown in Figure 2. This is expressed as a ratio of the percent of stand killed each year compared to the percent of stand killed in 1937. It is evident that the 1941 loss is nearly as low as in 1937 which was the lowest of the decade. This is comparable with the general trend of the infestation throughout the Klamath Basin where the 1941 gross loss was about equal to that which occurred in 1937.

The outlook for 1942 is also favorable. On the basis of the partial 1942 data available and the trend of the infestation, it is anticipated that the 1942 infestation will remain at about the same level.

Control Recommendations

With the western pine beetle infestation at such a low point and with no small localized areas of high concentration, no direct control work is needed on the Reservation at this time. It is to be noted, however, that losses continue to be heaviest in the fringe timber along the Sprague River. Portions of this are about the only remaining high hazard areas yet uncut and in all probability losses from insects will continue to be greatest in this area until the trees have been removed either through logging or by the insects.

Table 1. Pine timber killed by bark beetles on virgin check plots in 1940. Klamath Indian Reservation and included private lands.

Area and Unit	Plots	CHECK PLOTS: Ponderosa pine type Acres	CHECK PLOTS: Ponderosa pine type Volume(BM)*	GROSS 1940 LOSSES: No.of trees	GROSS 1940 LOSSES: Volume Total(BM)**	GROSS 1940 LOSSES: Volume BM per acre	GROSS 1940 LOSSES: Volume Percent of Stand	GROSS 1940 LOSSES: Volume Ratio to 1939
Klamath Marsh								
North Marsh	# 2 North Marsh	640	6,940,000	61	42,700	66	.62	.78
Little Yamsey	3 Little Yamsey	640	7,670,000	128	89,000	139	1.16	.92
	4 Jackson Cr.	320	4,470,000	20	14,000	44	.31	.37
Skellock	5 Skillock	640	8,950,000	52	36,400	57	.41	.74
Yamsey Mtn.	6 Yamsey Mtn.	640	5,300,000	96	67,200	105	1.27	.84
Wild Horse	7 Wild Horse	640	3,920,000	45	31,500	49	.80	.94
Taylor Butte	8 Taylor	640	6,920,000	41	28,700	45	.42	.35
Total	7	4,160	44,170,000	443	309,500	74	.70	.71
Sprague River								
N. Calimus	#13 Calimus Butte	320	7,710,000	24	26,000	81	.34	1.33
S. Calimus	14 So. Calimus	640	1,370,000	147	58,800	92	4.30	1.01
Fuego	15 Fuego Mtn.	640	7,090,000	75	53,000	83	.75	.84
Black Hills	17 Black Hills	640	6,120,000	59	35,500	55	.58	.76
Saddle Mtn.	22 Coptie Pr.	640	7,350,000	141	101,400	158	1.38	1.55
	28 Saddle Mtn.	640	3,000,000	102	40,800	64	1.36	1.32
Total	6	3,520	32,640,000	548	315,500	90	.96	1.11
Sycan Marsh								
Sycan	#16 Sycan	600	6,990,000	37	33,300	56	.48	.52
Coyote Cr.	29 Long Cr.	640	7,060,000	84	58,800	92	.83	.84
Total	2	1,240	14,050,000	121	92,100	74	.66	.68
Grand Total	15	8,920	90,860,000	1,112	717,100	81	.79	.83

* Green stand volume has been estimated from 1938 B.E.&P.Q. cruise.
** Volume losses have been estimated.

Table 2. Pine timber killed by bark beetles on virgin check plots in 1941. Klamath Indian Reservation and included private lands.

Area and Unit	CHECK PLOTS			GROSS 1941 LOSSES				
		Ponderosa pine type			Volume			
	Plots	Acres	Volume(BM)*	No.of trees	Total(BM)	BM per acre	Percent of stand	Ratio to 1939
Klamath Marsh								
Little Yamsey	# 3 Little Yamsey	320	3,790,000	13	9,740	30	.26	.22
Skellock	5 Skellock	320	4,460,000	13	13,580	42	.30	.74
Taylor Butte	8 Taylor	320	3,440,000	12	3,830	12	.11	.27
Total	3	960	11,690,000	38	27,150	28	.23	.35
Sprague River								
N. Calimus	#13 Calimus Butte	320	7,710, 000	20	23,560	74	.31	.91
Fuego	15 Fuego Mtn.	320	3,520,000	21	23,160	72	.66	.87
Saddle Mtn.	22 Saddle Mtn.	300	3,620,000	30	27,430	92	.76	.58
Total	3	940	14,850,000	71	74,150	79	.50	.70
Sycan Marsh								
Sycan	#16 Sycan	320	5,950,000	15	12,310	38	.20	.69
Coyote Cr.	29 Long Cr.	320	3,500,000	31	16,730	52	.48	.57
Total	2	640	9,450,000	46	29,040	45	.31	.61
Grand Total	8	2,540	35,990,000	155	130,340	51	.36	.57

* Estimated from 1938 B.E.&P.Q. cruise and 1942 high risk cruise.

Table 3. Insect-caused pine mortality. Klamath Indian Reservation and included private lands. Season of 1940.

Area and Unit	PONDEROSA PINE TYPE Acreage Virgin	Acreage Cut-over	Acreage Total	Volume MBM	ESTIMATED 1940 LOSSES Trees Total	Trees Per section	Volume Total (MBM)	Volume BM per acre	Percent of stand
BEAVER MARSH									
All Units		39,700	39,700	90,000	600	10	400	10	.4
FORT KLAMATH									
Agency	3,740	15,120	18,960	67,000	600	20	200	11	.3
KLAMATH MARSH									
North Marsh	15,680	17,370	33,050	196,000	1,100	21	800	24	.4
Little Yamsey	39,680		39,680	470,000	4,400	71	3,000	76	.6
Skellock	17,200		17,200	206,400	1,000	37	800	46	.4
Wild horse	31,200		31,200	274,900	1,900	39	1,300	42	.5
(Ind. Res.	4,310	2,240	6,550	43,000	200	20	100	15	.3
Yamsey)Long Bell	6,840	24,360	31,200	90,000	300	7	200	6	.2
(Total	11,150	26,600	37,750	133,000	500	8	300	8	.2
Taylor Butte	15,680	640	16,320	158,000	900	55	600	37	.4
Other Units	3,180	103,320	106,500	351,000	1,400	85	1,000	9	.3
(Ind. Res.	126,930	123,570	250,500	1,699,300	11,400	30	7,900	32	.5
Area)Long Bell	6,840	24,360	31,200	90,000	300	7	200	6	.2
Total (Total	133,770	147,930	281,700	1,789,300	11,700	27	8,100	29	.5
SYCAN MARSH									
(Ind.Res.	11,240		11,240	104,100	1,100	63	800	71	.8
Coyote Cr.)Long Bell	16,040	1,920	17,960	200,350	1,100	40	800	46	.4
(Total	27,280	1,920	29,200	304,450	2,200	49	1,600	55	.5
(Ind.Res.	16,080	11,800	27,880	160,000	600	14	400	14	.2
N. Sycan)Long Bell	15,840	3,680	19,520	156,000	800	26	500	26	.3
(Total	31,920	15,480	47,400	316,000	1,400	30	900	19	.3
Sycan	23,360	560	23,920	323,000	1,700	45	1,500	63	.5
Area (Ind.Res.	50,680	12,360	63,040	587,100	3,400	35	2,700	43	.5
Total)Long Bell	31,880	5,600	37,480	356,350	1,900	33	1,300	35	.4
(Total	82,560	17,960	100,520	943,450	5,300	34	4,000	40	.4

Table 3. (continued)

Area and Unit	PONDEROSA PINE TYPE Acreage Virgin	Acreage Cut-over	Acreage Total	Volume MBM	ESTIMATED 1940 LOSSES Trees Total	Trees Per section	Volume Total(MBM)	Volume BM per acre	Volume Percent of stand
SPRAGUE RIVER									
Saddle Mtn.	19,860	14,960	34,820	224,000	3,700	68	2,600	72	1.1
No. Calimus	15,100		15,100	230,000	1,900	80	2,100	139	.9
Fuego	14,960		14,960	181,940	2,000	86	1,400	94	.8
So. Calimus	13,440	3,120	16,560	73,000	2,700	100	1,100	66	1.5
Knott	14,560		14,560	93,520	1,700	75	1,200	82	1.3
Black Hills	22,080	950	23,030	184,000	4,100	114	2,500	108	1.4
Ferguson	4,480	1,920	6,400	15,000	400	40	300	47	2.0
Antelope	7,480	6,820	14,300	79,000	1,100	50	900	63	1.1
Bly Ridge	15,840	4,640	20,480	90,000	1,700	53	1,200	59	1.3
Others	14,900	105,500	120,400	310,000	2,500	20	1,500	12	.5
Area Total	142,700	137,910	280,610	1,480,460	21,800	50	14,800	53	1.0
Grand Total (Ind. Res.	324,150	328,660	652,810	3,923,860	37,800	37	26,000	40	.7
)Long Bell	38,720	29,960	68,680	446,350	2,200	20	1,500	22	.3
(Total	362,870	358,620	721,490	4,370,210	40,000	35	27,500	38	.6

Table 4. Insect-caused pine depletion. Klamath Indian Reservation and included private lands Season of 1941.

Area and Unit	PINE TYPE			Total MBM *	ESTIMATED 1941 LOSS				
	Virgin	Cut-over	Total		No. of trees	Volume MBM.	No. trees per section	BM per acre	Percent of stand
BEAVER MARSH									
All Units		39,700	39,700	90,000	1,700	350	27	9	0.39
FORT KLAMATH									
Agency	3,330	15,630	18,960	66,000	1,000	160	34	8	0.24
KLAMATH MARSH									
North Marsh	13,760	19,290	33,050	195,000	1,750	625	34	19	0.32
Little Yamsey	39,680		39,680	470,000	2,300	1,600	37	40	0.34
Skellock	17,200		17,200	206,425	770	540	30	31	0.26
Wildhorse	31,200		31,200	274,900	1,060	742	22	24	0.27
(Ind. Res.	4,310	2,240	6,550	43,000	150	87	15	13	0.20
Yamsey)Long Bell	1,470	29,730	31,200	89,000	1,000	160	20	5	0.18
(Total	5,780	29,970	37,750	132,000	1,150	247	20	7	0.18
Taylor Butte	14,660	1,660	16,320	157,450	700	410	25	25	0.26
Other Units	1,390	105,110	106,500	350,000	4,150	445	25	4	0.17
(Ind. Res.	122,200	128,300	250,500	1,696,775	10,880	4,449	27	17	0.26
Total)Long Bell	1,470	29,730	31,200	89,000	1,000	160	20	5	0.18
(Total	123,670	158,030	281,700	1,785,775	11,880	4,609	27	16	0.25
SYCAN MARSH									
(Ind. Res.	11,240		11,240	104,100	1,000	700	58	62	0.67
Coyote Cr.)Long Bell	16,040	1,920	17,960	200,350	1,000	625	35	34	0.31
(Total	27,280	1,920	29,200	304,450	2,000	1,325	44	45	0.43
N. Sycan (Ind. Res.	9,300	18,580	27,880	157,800	900	270	18	9	0.17
)Long Bell	14,180	5,340	19,520	154,700	800	440	29	22	0.28
(Total	23,480	23,920	47,400	312,500	1,700	710	22	15	0.22
Sycan	21,820	2,100	23,920	320,000	1,500	960	40	40	0.30
(Ind. Res.	42,360	20,680	63,040	581,900	3,400	1,930	34	30	0.33
Total)Long Bell	30,220	7,260	37,480	355,050	1,800	1,065	31	28	0.30
(Total	72,580	27,940	100,520	936,950	5,200	2,995	33	30	0.32

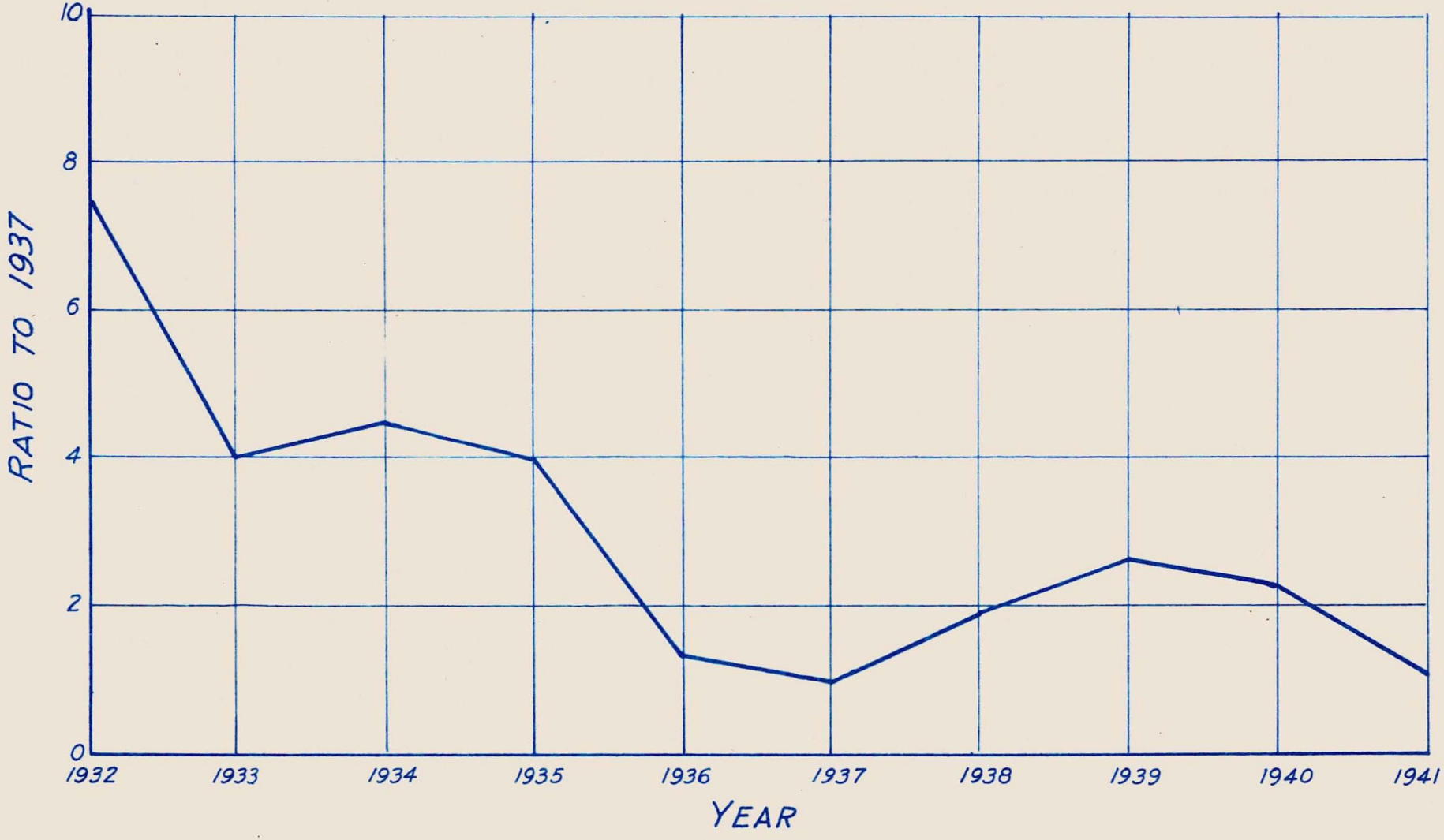
Table 4. (continued)

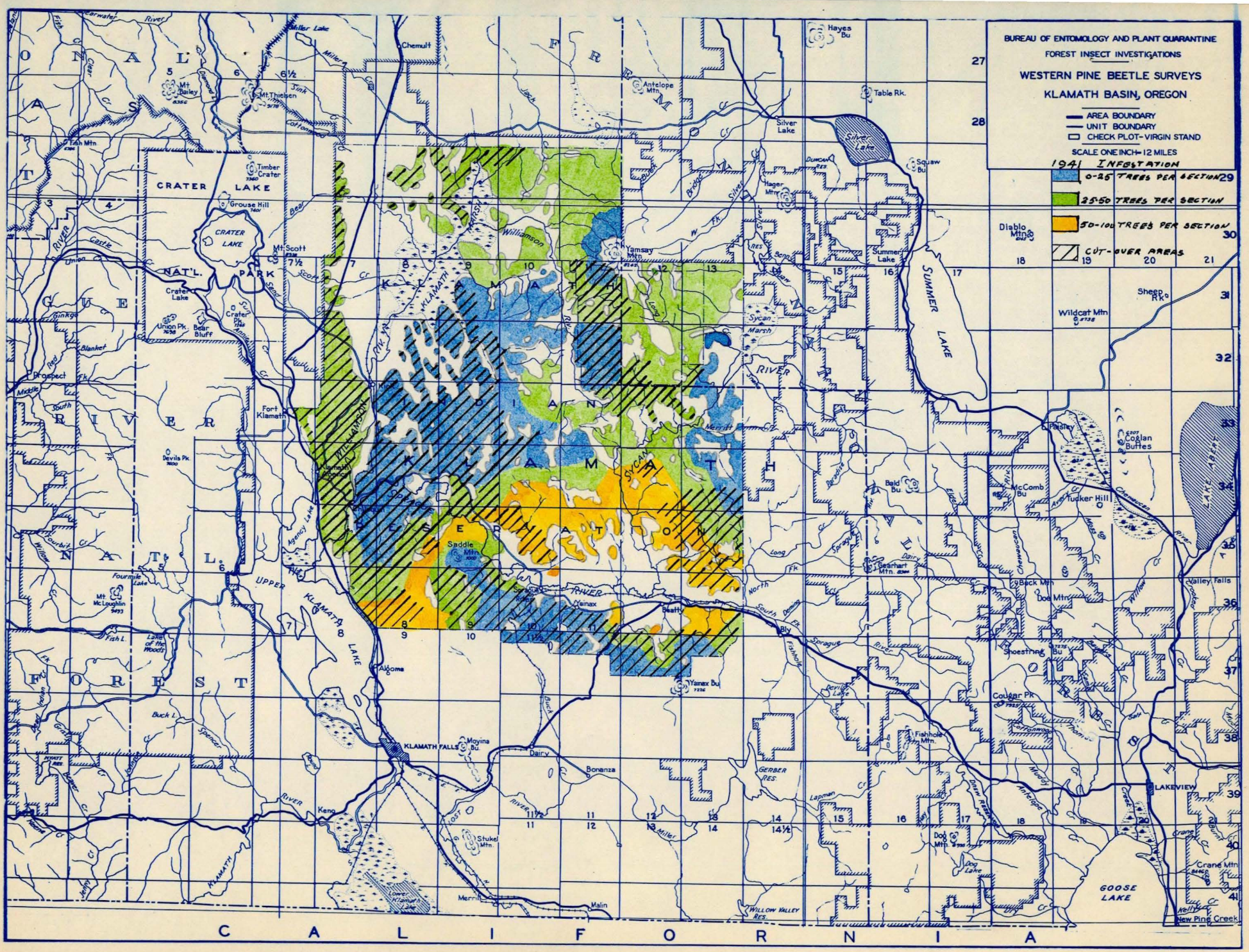
Area and Unit	PINE TYPE			Total MBM *	ESTIMATED 1941 LOSS				
	Virgin	Cut-over	Total		No. of trees	Volume MBM	No. trees per section	BM per acre	Percent of stand
SPRAGUE RIVER									
Saddle Mtn.	18,530	16,290	34,820	222,690	1,950	827	36	23	0.37
No. Calimus	14,790	310	15,100	230,000	820	900	35	60	0.39
Fuego	14,960		14,960	181,940	910	637	40	42	0.35
So. Calimus	7,140	9,420	16,560	71,750	1,300	490	52	29	0.66
Knott	14,560		14,560	93,520	1,150	830	50	56	0.89
Blackhills	16,960	6,070	23,030	182,830	3,000	1,627	83	70	0.89
Ferguson	3,720	2,680	6,400	13,900	200	118	20	18	0.85
Antelope	5,820	8,480	14,300	78,650	770	292	35	20	0.37
Bly Ridge	13,280	7,200	20,480	88,930	1,000	424	31	20	0.47
Other Units	2,720	117,680	120,400	300,000	4,600	580	24	5	0.19
Total	112,480	168,130	280,610	1,464,210	15,700	6,725	36	24	0.46
Grand Total)Ind. Res.	280,370	372,440	652,810	3,898,885	32,680	13,614	32	21	0.35
Grand Total (Long Bell	31,690	36,990	68,680	444,050	2,800	1,225	26	18	0.28
Grand Total)Total	312,060	409,430	721,490	4,342,935	35,480	14,839	31	20	0.34
Total Klamath Basin	1,419,830	937,830	2357,490	16,718,935	99,985	54,879	27	23	0.32

* This volume was estimated by adjusting Timber Survey volumes according to the trend shown by the half-section check plots. The volumes on the half-section check plots were estimated from the 1938 Bureau of Ent. & Plt. Quar. cruise and the 1942 high risk cruise. The volume on cut-over areas was determined by assuming that an average of 25 percent of the original volume was left.

TREND OF
WESTERN PINE BEETLE INFESTATION
KLAMATH INDIAN RESERVATION
AND INCLUDED PRIVATE LANDS

(Ratio of percent of stand killed to 1937 loss)




BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT INVESTIGATIONS
WESTERN PINE BEETLE SURVEYS
KLAMATH BASIN, OREGON
AREA BOUNDARY
UNIT BOUNDARY
CHECK PLOT-VIRGIN STAND
SCALE ONE INCH-12 MILES
1941 INFESTATION
0-25 TREES PER SECTION
25-50 TREES PER SECTION
50-100 TREES PER SECTION
CUT-OVER AREAS
CRATER LAKE NAT'L. PARK
KLAMATH MOUNTAINS
CASCADE MOUNTAINS
FREMONT NAT'L. FOREST
UPPER KLAMATH LAKE
KLAMATH FALLS
LAKEVIEW
GOOSE LAKE
SUMMER LAKE
CALIFORNIA